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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/714,307	11/14/2003	Xueping Xu	ATMI-687	2122

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INTELLECTUAL PROPERTY / TECHNOLOGY LAW
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EXAMINER

STEIN, STEPHEN J

ART UNIT PAPER NUMBER

1775

DATE MAILED: 06/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/714,307

Applicant(s)

XU ET AL.

Examiner

Stephen J. Stein

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) 22-38 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-17, 19-21 and 39 is/are rejected.
- 7) ☒ Claim(s) 18 is/are objected to.
- 8) ☐ Claim(s) _ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 2/24/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election with traverse of Group I in the reply filed on April 21, 2005 is acknowledged.

The traversal is on the grounds that the restriction requirement lacks proper support for assertion of distinctiveness and because the restriction requirement failed to assert or make a showing for independence of the subject matter of the claimed groups. Applicant further states that the Group I and Group II claims are not independent, but rather related and interdependent since independent claim 1 (Group I) and independent claim 22 (Group II) share identical text of claim 1. They therefore assert that the subject matter of the respective claims of both groups is intimately closely related. Applicants still further assert that the asserted basis of distinctiveness is unsupported on based solely on speculation. Applicants state they are unaware of any currently available etching process that is capable of producing the recited structure. Applicants finally state that the subject matter of Group I and Group II are so closely related that it without serious burden to the examiner.

This traversal has been carefully considered, but not deemed persuasive. First, it is noted that MPEP 806 (b) recites that "Where inventions are related as disclosed but are distinct as claimed, restriction may be proper". Therefore, claimed inventions may be restricted even if they are related when they are distinct. The Group I and Group II claims were indicated by the examiner who made the restriction as related in a Process of Making and Product Made relationship.

MPEP 806.05(f) recites that that "A process of making and a product made by the process can be shown to be distinct inventions if either or both of the

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following can be shown: (A) that the process *as claimed* is not an obvious process of making the product and the process *as claimed* can be used to make other and different products; or (B) that the product *as claimed* can be made by another and materially different process.

Allegations of different processes or products need not be documented.

In this case the examiner who made the restriction requirement asserted a materially different process for making the claimed product. Applicants have provided no evidence nor explained why the asserted materially different process could not be used to make the claimed product. Consequently, the assertion of distinctiveness of the claimed inventions remains valid. Finally, with regard to the argument that there is no serious burden on the examiner to examine the two groups, it pointed to applicants that in the restriction requirement the examiner has shown that subject matter of the two groups encompass two different statutory classes of invention each having a different classification. For purposes of the initial requirement of a restriction, a serious burden on the examiner may be *prima facie* shown if the examiner shows by appropriate explanation either separate classification, separate status in the art, or a different field of search as defined in MPEP § 808.02

The examiner will consider rejoinder under MPEP 821.04 at the time of determination of the allowability of the all pending Group I claims, if the non-elected method claims are commensurate in scope with the allowable article claims.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-6, 13, 15, 16, 19-21 and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by US 2001/0030329 A1 (Ueta et al.).

Ueta teaches a GaN substrate with a 0001 plane having a crystal orientation which is tilted away (off-cut) from a <0001> direction by an angle of from equal or greater to 0.05 ° to less than or equal to 2 ° (paragraph 0013). Ueta further teaches that the GAN substrate is tilted away from <0001> direction in a <1120> or <1120> direction (paragraph 0015). The reference still further teaches an average surface roughness of less than 0.09nm (See Figure 10) and a dislocation density of less than $5E5 \text{ cm}^{-2}$ (See Figure 7). Ueta further teaches that GaN substrate has a semiconductor multilayer structure including a single crystal GaInAlN acceptor layer, and active layer including a light emitting region formed on the substrate (paragraphs 0013-0014) and that these structures are used for semiconductor light emitting devices such as blue and green light emitting diodes (paragraph 0004).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-17, 19 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zauner et al., *Homo epitaxial GaN growth on exact and misoriented single crystals: suppression of hillock formation Crystal Growth*, 210, 435 (2000), pp. 435-443 (Zauner et al.).

Zauner teaches a GaN single crystal substrate having a 0001 plane which is polished to obtain off-angle orientations (off-cuts) of 0, 2 and 4° towards the 1010 direction (abstract). The reference teaches the single crystal substrate was also polished to 4° towards the 1120 direction (page 438). With regard to the claimed dislocation density, it is expected that the disclosed

crystal will meet this claimed property since it is the same composition as claimed by applicants. It has been held that where the claimed and prior art products are identical or substantially identical in structure or are produced by identical or a substantially identical processes, a prima facie case of either anticipation or obviousness will be considered to have been established over functional limitations that stem from the claimed structure. *In re Best*, 195 USPQ 430, 433 (CCPA 1977), *In re Spada*, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). The *prima facie* case can be rebutted by evidence showing that the prior art products do not necessarily possess the characteristics of the claimed products. *In re Best*, 195 USPQ 430, 433 (CCPA 1977).

Although Zauner fails to teach the claimed RMS roughness, absent a showing of criticality with respect the claimed surface roughness (a result effective variable), it would have been obvious to a person of ordinary skill in the art at the time of the invention to polish the GaN surface to a optimal RMS smoothness in order to achieve optimal epitaxial growth. It has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Allowable Subject Matter

6. Claim 18 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As stated above, while the closest prior art of record (Ueta) teaches a GaN substrate with a 0001 plane having a crystal orientation which is tilted away (off-cut) from a $\langle 0001 \rangle$ direction by an angle of from 0.05° to 2° towards a $\langle 1120 \rangle$ or $\langle \bar{1}120 \rangle$ direction with a RMS roughness of less than 0.9 nm and a dislocation density of less than $5 \times 10^5 \text{ cm}^{-2}$, the reference fails to specifically teach or suggest a that the GaN (0001) surface is offcut from a $\langle 0001 \rangle$ direction towards a $\langle 1010 \rangle$ or $\langle \bar{1}120 \rangle$ direction at an offcut angle in a range of from about 5 to about 8 degrees.

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Stein whose telephone number is 571-272-1544. The examiner can normally be reached on Monday through Friday from 8:30 a.m. to 5:00 p.m. If the attempts to reach the examiner are unsuccessful, the examiner's supervisor, Deborah Jones can be reached by dialing 571-272-1535. The official fax number is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR

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system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

June 17, 2004



Stephen J. Stein
Primary Examiner
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